REPORT DOCUMENTATION PAGE

AFRL-SR-AR-TR-03-

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching exit the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Rec

00 73

1. AGENCY USE ONLY (Leave blank)

2. REPORT DATE

3. REPORT TYPE AND DATES COVERED

01 Mar 2002 to 31 Dec 2002 FINAL 5. FUNDING NUMBERS

4. TITLE AND SUBTITLE

The High Voltage Workshop and Power Modulator Conference 2002

61102F 2301/EX

6. AUTHOR(S)

Dr Gundersen

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
UNIVERSITY OF SOUTHERN CALIFORNIA
LOS ANGELES, CA 90089-1052

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

AFOSR/NE 4015 WILSON BLVD SUITE 713 ARLINGTON VA 22203 10. SPONSORING/MONITORING AGENCY REPORT NUMBER

F49620-02-1-0116

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION AVAILABILITY STATEMENT
APPROVED FOR PUBLIC RELEASE, DISTRIBUTION UNLIMITED

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

THE 2002 INTERNATIONAL POWER MODULATOR CONFERENCE WAS A GRAND SUCCESS! OVER 240 PEOPLE ATTENDED AND THEY CONTRIBUTED OVER 150 PAPERS FOR PUBLICATION. THE CONFERENCE SERVED AS HOST TO NINE EXHIBITORS WHO DISPLAYED THEIR LATES HIGH TECHNOLOGY PRODUCTS.

14. SUBJECT TERMS

20030326 024

15. NUMBER OF PAGES

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT

UNCLASSIFIED

18. SECURITY CLASSIFICATION OF THIS PAGE

UNCLASSIFIED

19. SECURITY CLASSIFICATION OF ABSTRACT

UNCLASSIFIED

20. LIMITATION OF ABSTRACT

UL

Standard Form 298 (Rev. 2-89) (EG) Prescribed by ANSI Std. 239.18 Designed using Perform Pro, WHS/DIOR, Oct 94

"THE HIGH VOLTAGE WORKSHOP AND POWER MODULATOR CONFERENCE (2002)"

FINAL PROGRESS REPORT

MARTIN A. GUNDERSEN, P.I.

FEBRUARY 2003

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH

F49620-02-1-0116

Approved for Public Release
Distribution Unlimited

Preface

The 2002 International Power Modulator Conference is a merger of the Twenty-Fifth International Power Modulator Symposium with the 2002 High Voltage Workshop. We merged the two meetings because they have many things in common: Both traditionally occur in the early summer on even-numbered years and they principally feature applied technologies that interest many of the same people. The Symposium and Workshop have served the pulsed power and high voltage communities for decades and are supported by many of the same sponsors. Unfortunately, both meetings have also experienced a decline in attendance over the past ten years. We merged the meetings to increase attendance and to better serve our communities in the following ways:

- Publish Combined Proceedings The new Power Modulator Conference publishes papers from the symposium and the workshop, in an effort to increase the reference value of both meetings. Normally, the workshop does not collect and publish papers. Now we do.
- Feature New Technologies in Various Ways
 The symposium and workshop activities were scheduled separately but in a complementary way. The Symposium portion of the conference features two days of oral and poster sessions that cover a very wide range of topics. The workshop features only four frontier-technology topics and

- presents the information in a one-day plenary forum. We designed the conference to have a variety of topics and presentation methods so that the combined meeting is lively and interesting.
- Combine Resources The symposium and workshop compete each year for contributions from many of the same sponsors and compete for those attendees who cannot afford to attend both events. By combining the two meetings, our sponsors made a single contribution and attendees made a single trip. In each case, sponsor and attendee receive more value for their money.

We are pleased to report that the merger was a grand success! Over 240 people attended the International Power Modulator Conference and they contributed over 150 papers for publication. The conference served as host to nine exhibitors who displayed their latest high-technology products. The conference also introduced two new awards that commemorate the lives and accomplishments of Tom Burkes and William Dunbar.

Thank you for your interest and support of the new 2002 International Power Modulator Conference.

Hugh Kirbie Dan Goebel Conference Co-Chairs

TABLE OF CONTENTS

To Use this Table of Contents: Scroll down or use the bookmarks in the left-hand frame to move to a new location in this index. Click on a blue paper title to view that paper. Titles in black indicate that no paper was available at the time of production. To return to this index after viewing a paper, click the PREVIOUS MENU bookmark in the left frame.

The Material on this CD-ROM was created from scanning each author's paper originals. Viewing of the text and graphics and the ease of readability will depend largely on content requiring scanning and the quality and/or consistency of each author's paper original.

PLENARY SESSIONS 1 and 2

Interaction of Rapid Magnetic Fields with Plasmas and Implications to	
Pulsed-Power Systems	17
Yitzhak Maron, R. Arad, A. Weingarten, K. Tsigutkin, Yu. V. Ralchenko,	
D. Osin, Weizmann Institute of Science, A. Fruchtman, Holon Academic	
Institute of Technology, N. Chakrabarti, Saha Inst. of Nuclear Physics,	
R. J. Commisso, B. V. Weber, Naval Research Laboratory	
Pulsed Power Switching Technology	23
Hardev Singh, Harry L. Moore, U. S. Army,	
W. J. Sarjeant, State University of New York at Buffalo	
Rotating Machines for Pulsed Power	33
W. Walls, Science Applications International Corporation	
An Overview of Electron Beam Decontamination Technology and Applications	39
B. Turman, R. Kaye, J. Jacobs, Sandia National Laboratories	

UNAVAILABLE FOR PUBLICATION

Ultra-Compact Pulsed Power

G. Andrew Erickson, Los Alamos National Laboratory

TABLE OF CONTENTS

To Use this Table of Contents: Scroll down or use the bookmarks in the left-hand frame to move to a new location in this index. Click on a blue paper title to view that paper. Titles in black indicate that no paper was available at the time of production. To return to this index after viewing a paper, click the PREVIOUS MENU bookmark in the left frame.

The Material on this CD-ROM was created from scanning each author's paper originals. Viewing of the text and graphics and the ease of readability will depend largely on content requiring scanning and the quality and/or consistency of each author's paper original.

ORAL SESSIONS

ORAL SESSION 1 Accelerators

Overview and Status of the Dual Axis Radiographic Hydrodynamics Test	
(DARHT) Facility	97
M. Burns, H. Davis, C. Ekdahl, C. Fortgang, H. Kirbie, T. McCuistian, K. Nielsen,	
K. Chow, Los Alamos National Laboratory, W. Fawley, H. Rutkowski, W. Waldron,	
S. Yu, Lawrence Berkeley National Laboratory, G. Caporaso, Y. Chen, E. Cook,	
J. Watson, Lawrence Livermore National Laboratory	
Solid-State Pulsed Power Systems for the Next Linear Collider	102
J. Casey, M. Gaudreau, F. Arntz, T. Hawkey, M. Mulvaney,	
M. Kempkes, P. Dandridge, P. VerPlanck Diversified Technologies, Inc.	
Design and Testing of a Fast, 50 kV Solid-State Kicker Pulser	106
E. Cook, B. Hickman, B. Lee, S. Hawkins, E. Gower, F. Allen, Lawrence Livermore	
National Laboratory, P. Walstrom, Los Alamos National Laboratory	
A Slotted Beam Pipe Kicker Magnet with Solid State Drive for SPEAR III	110
C. Pappas, Stanford Linear Accelerator Center	
Dual Branch High Voltage Generator for the Beam Extraction of the Large	
Hadron Collider	114
J. Bonthond, J. Dieperink, L. Ducimetière, U. Jansson, E. Vossenberg, CERN	
Three Turn Secondary for the Prototype SLAC Solid State Induction Modulator	118
R. Cassel, J. deLamare, M. Nguyen, C. Pappas, Stanford Linear Accelerator Center,	
E. Cook, J. Sullivan, Lawrence Livermore National Laboratory,	
C. Brooksby, Bechtel Nevada	
•	

WITHDRAWN

Compact Electron Beam Sterilizer on the Basis of EH-Accelerator

V. Kulish, National Aviation University, A. Melnyk, Sumy State University, I. Gubanov, EH-Accelerator Company, Inc.

ORAL SESSION 2 Pulsed Power Applications I

The Electra KrF Laser	121
High-Voltage, High-Power, Pulse-Step Modulators for the Accurate Supply of Gyrotron	126
and Other Heating Devices	120
High Electron Density, Atmospheric Pressure Air Glow Discharges	130
Energy Trapping and Adaptive Clocking Innovations Applied to Capacitor Charging	13/
Series Resonant Inverters	134
Repetitive Pulsed Wire Discharge for Applications to Material Science	138
Design and Testing of a Compact Sub-GW, Subnanosecond Pulser	142
Rapid Capacitor Charger	146
M. Giesselmann, T. Heeren, Texas Tech University	
ORAL SESSION 3 Pulsed Power Applications II	
Production of Large Volume Discharges in Water and Their Industrial Applications H. Akiyama, S. Katsuki, T. Namihira, <i>Kumamoto University</i> , K. Ishibashi, N. Kiyosaki, <i>Nishida Tekko Corporation</i>	150
Application of Pulsed Electron Beams for Improvement of Material	154
Surface Properties	134
F. Zimmermann, H. Bluhm, Institute for Pulsed Power and Microwave	
Technology, V. Engelko, Efremov Institute of Electrophysical Apparatus,	
V. Shulov, N. Notchovnaia, <i>Moscow Aviation Institute</i>	

Flue Gas Treatment by Pulsed Power
Pulsed Power Conditions for Cost Effective Diesel Exhaust Treatment
Advanced Pulsed Power Concept and Component Development for KrF Laser IFE
Power Conditioning for Pulsed Electrostatic Precipitators
Generation of Focused Shock Waves by Multi-Channel Electrical Discharges in Water
ORAL SESSION 4 Closing and Opening Switches I
SOS/DBD-Based Solid-State Switching for Ultra-High-Power Short Pulse Generation
Methods and Configurations for Improving Photo-Conductive Switch Performance
Development and Characterization of Diamond-Coated Photoconductive Switches for Stacked Blumlein Pulsers
Semiconductor Components and Solid State Switches for Power Modulator Applications193 A. Welleman, E. Ramezani, J. Waldmeyer, <i>ABB Switzerland Ltd</i> .
High Frequency High Power MOSFET Development
Electrical Breakdown of Sub-Millimeter Water Gaps S. Katsuki, S. Xiao, R. Joshi, M. Laroussi, K. Schoenbach, Old Dominion University
ABSENT IN SESSION

FID Nano- and Picosecond Pulse Generators with Gigawatt Peak Power V. Efanov, A. Kriklenko, $FID\ GmbH$

ORAL SESSION 5

Closing and Opening Switches II

Pulsed Corona Generation Using a High-Power Semiconductor Diode Switch	203
High Temperature Inductive Switching of SiC GTO and Diode	207
Semiconductor Opening Switch Based Repetitive Pulsed Power Generator	210
Losses in Magnetic Switches	214
Cold Cathode Thyratron Development for Pulsed Power Applications	217
High Coulomb Transfer Pseudo-Spark Switch	221
Compact Nanosecond Pulse Generator for Cell Electroperturbation Experiments	225
ORAL SESSION 6 High Power Microwaves, Modeling, and HF Techniques	
High-Power Microwave Generation by Virtual Cathode Oscillator W. Jiang, M. Sato, K. Yatsui, Nagaoka University of Technology	229
Microwave Breakdown Studies of He-N ₂ Mixtures in a Pillbox Cavityfrom 760 to 3040 Torr D. Hemmert, A. Neuber, J. Dickens, <i>Texas Tech University</i>	232
The Generation of High Electric Field Strength RF Energy Using Marx Generators J. Mayes, W. Carey, Applied Physical Electronics	236
High Energy Pulse Modulator for Microwave Tube Applications R. Richardson, D. Judd, B. Wenham, Marconi Applied Technologies	240
Gigawatt S-Band Frequency-Tunable HPM Sources	244
Subnanosecond Hybrid Modulator for UWB and HPM Applications	248

UNAVAILABLE FOR PUBLICATION

Efficiency Doubling of a Plasma-Assisted Microwave Source Due to Two-Dimensional Electron Motion

A. Shkvarunets, , Y. Carmel, G. Nusinovich, T. Abu-elfadl, J. Rogers, T. Antonsen, Jr., V. Granatstein, *University of Maryland*, D. Goebel, *Boeing EDD*

ORAL SESSION 7 High Power Sources and High Current Loads
The ZR Refurbishment Project
High Power Battery Tester Development
High Power Fast Kicker System for SNS Beam Extraction
205-kA Pulse Power Supply for Neutrino Focusing Horns
The Advanced Photon Source LINAC Modulators PSPICE Simulation and Upgrade270 A. Cours, T. Smith, <i>Argonne National Laboratory</i>
Ferroelectric Plasma Sources
Y. Krasik, K. Chirko, A. Dunaevsky, J. Gleizer, A. Krokhmal, A. Sayapin, J. Felsteiner, Technion-Israel Institute of Technology
High Voltage Modulator Family for Diagnostic Neutral Beam Injectors
ORAL SESSION 8 High Voltage Components and Dielectric Breakdown
Thin Film, Diamond-Like Carbon Dielectrics
Development of Low Inductance, High Power Plastic Case Capacitors for the SNS Polyphase Resonant Converter-Modulator

R. Cooper, J. Ennis, F. MacDougall, J. Bates, Sorrento Electronics, Inc., W. Reass,

D. Baca, J. Doss, R. Gribble, P. Tallerico, Los Alamos National Laboratory

Interfacing Pulsed Power Systems to Switching Power Supplies
Surface Flashover Across Ceramic Disks in Vacuum at Cryogenic Temperatures
Lifetime Considerations of High Voltage Semiconductor Diodes for Pulsed Power Applications
WITHDRAWN
Partial Discharge Diagnosis Based on Time Between Pulses
Energy Storage Capacitor Technologies
UNAVAILABLE FOR PUBLICATION
A Novel Dual Resonant Transformer for Charging Low Capacitance Loads

TABLE OF CONTENTS

To Use this Table of Contents: Scroll down or use the bookmarks in the left-hand frame to move to a new location in this index. Click on a blue paper title to view that paper. Titles in black indicate that no paper was available at the time of production. To return to this index after viewing a paper, click the PREVIOUS MENU bookmark in the left frame.

The Material on this CD-ROM was created from scanning each author's paper originals. Viewing of the text and graphics and the ease of readability will depend largely on content requiring scanning and the quality and/or consistency of each author's paper original.

POSTER SESSION A

Accelerators, High Power Sources/High Current Loads, and High Voltage Components, and Dielectric Breakdown

Pulsed Power Systems for the Dual-Axis Radiographic Hydrodynamics Test	
(A) I I I I I I I I I I I I I I I I I I I	309
M. Burns, H. Kirbie, B. McCuistian, K. Nielsen, Los Alamos National Laboratory,	
H. Rutkowski, W. Waldron, S. Yu, Lawrence Berkeley National Laboratory,	
E. Cook, J. Watson, Lawrence Livermore National Laboratory	
A New Modulator Controller of the PLS Linac	313
S. Kim, S. Park, S. Kim, Y. Han, S. Nam, Pohang University of Science and Technology	
Outline of Power Modulator Work Supported by DOE SBIR Grants	317
R. Koontz, Stanford Linear Accelerator Center	
Analog Amplitude Modulation of a High Voltage, Solid State, Inductive Adder,	
Pulse Generator Using MOSFETs	321
E. Gower, J. Sullivan, Lawrence Livermore National Laboratory	
Low Inductance Pulser System Drives a Fast Magnet at DARHT	325
E. Rose, R. Bartsch, D. Custer, C. Ekdahl, R. Montoya,	
J. Smith, Los Alamos National Laboratory	
Solid-State Modulated Kicker Pulser	328
B. Lee, F. Allen, R. Anaya, E. Cook, S. Hawkins, B. Hickman,	
J. Watson, Lawrence Livermore National Laboratory	
Control System for the LLNL Kicker Pulse Generator	331
J. Watson, R. Anaya, E. Cook, B. Lee, S. Hawkins,	
Lawrence Livermore National Laboratory	
Development of Bipolar Accelerator for Pulsed Ion Beam Implantation	334
K. Masugata, Y. Kawahara, C. Mitsui, I. Kitamura, T. Takahashi,	
Toyama University, Y. Tanaka, H. Tanoue, K. Arai, Electro-Technical Laboratory	

High Power Thermal Battery Development F. Peterkin, NSWC, P. Butler, R. Guidotti, L. Moya, F. Reinhardt, Sandia National Laboratories	338
The Magnetic Flux Compression Scheme as a Power Amplification & Pulse Shaping Stage M. Bavay, P. L'Eplattenier, C. Mangeant, F. Hamann, P. Monjaux, F. Lassalle, Centre d'Etudes de Gramat, M. Mazarakis, Sandia National Laboratories, G. Avrillaud, B. Lalle, ITHPP	:343
Analysis of a Railgun Capacitor-Muzzle-Shunt Energy Recovery Scheme J. Bernardes, G. LaCava, M. Schrader, Naval Surface Warfare Center	347
Battery Operated Portable 300 kV Pulsed Power System V. Chaudhari, A. Shyam, R. Kumar, D. Lathi, P. Sarkar, R. Verma, S. Chaturvedi, J. Sonara, K. Shah, B. Adhikary, <i>Institute for Plasma Research</i>	351
Compact Nanosecond Pulse Generator for Cell Electroperturbation Experiments	354
Micropulser for Real-Time Microscopy of Cell Electroperturbation	358
Research and Experiment of HT-7U Lower Hybrid Current Drive HVPS	362
A High Power Vacuum Rotary Arc Gap Closing Switch for Pulsed Power Applications G. Rim, H. Lee, K. Seo, Korea Electrotechnology Research Institute, T. Lee, Inha University, L. Hwang, H. Kim, VITZRO Tech Co., Ltd.	366
Design of a New Driver for Fast and Ultra-Powerful Capillary Discharge	370
Feasibility Study of an Explosively Formed Transient Antenna	374
High Stable Modulators for Klystron Supplying	378
High Rep-rate Inductive-Energy-Storage Pulsed Power Modulator Using High Voltage Static Induction Thyristor	382
K. Yamashita, M. Watanabe, A. Okino, E. Hotta, <i>Tokyo Institute of Technology</i> , N. Shimizu, K. Iida, <i>NGK Insulators Ltd</i> .	
A Hybrid Solid-State Induction Modulator with Pulse Transformer to Drive	204
SLAC Klystrons J. deLamare, Stanford Linear Accelerator Center	300
Marx-Stacked IGBT Modulators for High Voltage, High Power Applications	390

Multi-Channel Pulse Generator	394
E. Bolshakov, V. Burtsev, D. Getman, A. Sedov, D. V. Efremov Scientific Institute of Electrophysical Apparatus	
High-Frequency Multi-Purpose Pulse Generator	396
V. Engelko, E. Bolshakov, U. Istomin, O. Pechersky,	
D. V. Efremov Scientific Research Institute of Electrophysical Apparatus	
Compact Marx Generator Test System	399
F. Peterkin, B. Hankla, J. Stevens, J. Sharrow,	
D. Stoudt, Naval Surface Warfare Center	
High Repetition Frequency Picosecond Pulse Generator	403
S. Zazoulin, Pulse Systems Group, A. Kardo-Sysoev,	
S. Moryakova, Ioffe Physico-Technical Institute	
Design and Experiments of an Automatic Repetitive Charging System of 100 kV and 2A . Y. Tan, M. Han, X. Wang, L. Chen, <i>Tsinghua University</i>	406
Experimental Results on the Breakdown Behaviour of Concrete Immersed in Water W. Frey, R. Straessner, W. Edinger, H. Bluhm, Institute for Pulsed Power and Microwave Technology	410
Contaminated Connector and Surface Atmospheric Flashover Phenomena: A Preliminary Investigation	414
J. Buneo, J. Zirnheld, K. Burke, W. Sarjeant, State University of New York at Buffalo	
Measurements of Spatial Distributions of Gas Temperature and Ozone Concentration in	417
Barrier Discharge Type of Ozonizer	41/
Transmission Line Transformers for up to 100 kW Pulsed Power Generation	420
K. Yan, E. van Heesch, P. Wouters, A. Pemen, S. Nair,	
Eindhoven University of Technology	
The state of the s	424
Electrical Insulation and RF Breakdown in Space Environment	424

ABSENT IN SESSION

Variable Frequency Operation of a 50-kV Line-type Modulator

K. Dixit, V. Yadav, R. Chavan, A. Chindarkar, K. Mittal, R. Sethi, *Bhabha Atomic Research Center*

The Novel Approach to Theoretical and Practical Consideration of the Accelerator in Crossed Electrical and Magnetic Fields wit the Closed Drift of Electrons

A. Zharinov, Y. Kovalenko, D. Novichkov, A. Kovalenko, All-Russian Electrotechnical Institute

Review of Construction Schemes of Mega-Ampere Current Pulses Formation for T-1 Facility

A. Pikar, V. Gurin, V. Demidov, V. Kataev, P. Korolev, M. Klimashov, V. Letyagin,

G. Makartsev, I. Markevtsev, V. Nudikov, B. Ptitsin, A. Russkov, A. Saratov, V. Selemir,

A. Shuvalov, All Russian Scientific Research Institute of Experimental Physics

Numerical Calculation of Non-linear Magnetic Field Diffusion for Definition of Macrobodies Maximum Velocity at Inductive Acceleration

A. Pikar, V. Gurin, V. Kataev, P. Korolev, M.Klimashov, All Russian Scientific Research Institute of Experimental Physics

Numerical Simulation Methods of Magnetic Flux Compression in Helical Magnetocumulative Generators

A. Pikar, Y. Derugin, P. Korolev, V. Klimashov, All Russian Scientific Research Institute of Experimental Physics

The Peculiarities of Mode of the Flywheel Unit with the Electric Machine of Double Power Supply

P. Rutberg, R. Goncharenko, E. Kasharsky, Y. Shakaryan, Institute of Problems of Electrophysics

Pseudospark in Inductive Energy Storage

A. Arefjev, N. Vereschagin, S. Kruglov, Radioengineering Academy

Inductive Energy Storage for Nitrogen Laser

A. Arefjev, N. Vereschagin, S. Kruglov, A. Gorlov, I. Kun, Radioengineering Academy

Induction Mechanism of High Power Electrons Acceleration in Laser-Produced Plasma

V. Belyaev, Central Research Institute of Machine Building of Russian Aviation and Space Agency, V. Mikhaylov, Institute of Strategic Stability

Theoretical Treatment of Anomalous Diffusion as Driver for Dynamic Pinch

V. Belyaev, Central Research Institute of Machine Building of Russian Aviation and Space Agency, V. Mikhaylov, Institute of Strategic Stability

Compact 10 kV, 10 kHz, Solid State Modulator for UWB Systems

A. Kardo-Sysoev, V. Kozlov, S. Moryakova, I. Smirnova, *Ioffe Physico-Technical Institute*, V. Sergeev, V. Karavaev, *Pulse Systems Group*

v. Sergeev, v. Karavaev, Puise Systems Group

Transients in Pulsed, High-Current Circuits with Massive Conductors

B. Fridman, D. V. Efremov Institute of Electrophysical Apparatus

Shock Compression of Graphite in a Z-Pinch Scheme

B. Fridman, D. V. Efremov Institute of Electrophysical Apparatus, I. Mararevich, Institute of Problems of Electrophysics of RAS, A. Rakhel, High Density Center of United Institute of High Temperature of RAS, B. Rumyantsev, A. F. Ioffe, Physic Technical Institute of RAS

Wire Array Compression with Prolonged Plasma Formation

I. Glazyrin, A. Slesareva, O. Kotova, P. Sasorov, Russian Federal Nuclear Center - VNIITF,

E. Grabovsky, S. Nedoseev, G. Oleinik, A. Samokhin, TRINITI

Simulation of Wire Array Compression in R-Phi Geometry

I. Glazyrin, I. Litvinenko, A. Sapozhnikov, A. Slesareva, Russian Federal Nuclear Center - VNIITF

Power Modulation of Pulsed Power Supply for a High Power Laser

K. Liu, S. Qin, Huazhong University of Science and Technology

Electroexplosion Current Switch

A. Vedernikov, N. Kas'yanov, V. Kovalev, V. Kononenko, A. Kormilitsin, A. Pavlenko, V. Filatov, *Russian Federal Nuclear Center – VNIITF*

Explosive Magnetic Generators of Powerful High-Voltage Pulses

A. Kucherov, V. Chernyshev, G. Volkov, A. Glybin, A. Ivanov, A. Krayev, A. Mezhevov, S. Pak, A. Skobelev, *Institute of Experimental Physics*

Electrical Explosion and Its Application for High Current Commutation in Different Electrophysical Installations with Inductive/Capacitive Energy Storage

V. Burtsev, N. Kalinin, D. V. Efremov Scientific Research Institute of Electrophysical Apparatus

Operation of Magnetic Flux Compressor with Electro-Explosive Opening Switch on the Capacitive Load

K. Gorbachev, A. Lisichkin, E. Nesterov, V. Stroganov, V. Fortov, E. Chernykh, *Institute for High Energy Densities*

Multipurpose Compact Generator for High-Power High-Current Nanosecond Pulse Production

K. Gorbachev, A. Lisichkin, E. Nesterov, V. Stroganov, V. Fortov, E. Chernykh, *Institute for High Energy Densities*

Increase of Frequency of High-Current Relativistic Electron Beam Impulses at the Sacrifice of Electron Temperature Decrease

E. Protasevich, Tomsk Polytechnic University

Improvement of the Adequacy of EMP Simulation

L. Vavriv, A. Serebyannikov, Research Institute Molniya, D. D. Vavriv, Kharkov National University of Radioelectronics

Pulse Current Generators for Electrogydropulse Installations

A. Vovchenko, I. Vovk, L. Miroshnichenko, Goloborodko, Institute of Pulse Research and Engineering

Power Supplies for Compact Submerged High-Voltage Equipment

K. Dubovenko, Y. Kurashko, I. Shvets, Institute of Pulse Research and Engineering

High Repetitive Generation of Underwater Electric Discharges

K. Dubovenko, A. Vovchenko, V. Chemerys, A. Blaschenko, Y. Boychenko, S. Kozak, A. Lytvynov, *Institute of Pulse Research and Engineering*

Experimental Study of a Repetitive Compact Marx Generator

L. Veronm, Commissariat à l' Energie Atomique, J. Brion, Europulse

Development of a Pulsed Modulator for Feeding Power to Magnetron Guns with Secondary-Emission Cathodes

A. Dovbnya, M. Krasnogolovets, N., Reshetnyak, V. Romas'ko, Y. Volkolupov, V. Zakutin, *Kharkov Institute of Physics and Technology*

Elaboration of the System of Classification of Partial Discharges in Polyethylene Insulation

M. Rezinkina, O. Rezinkin, Kharkov State Polytechnic University

Study on the Hydrophobility Transfer of RTV-SIR Coating

Z. Jia, Z. Guan, Tsinghua University

Characteristics of RTV-SIR Coating at Low Air Pressure

Z. Jia, J. Zhou, L. Wang, Z. Guan, Tsinghua University

Study on Spark Over Behavior of Insulator Under Combined AC and Lightning Impulse Voltage

Z. Shi, L. Wang, Z. Guan, G. Wang, Tsinghua Universityy

Pulsed Surface Flashover of Insulators in Oil, Water and Vacuum

A. Sharma, K. Nagesh, R. Sethi, Bhabha Atomic Reasearch Centre, G. Nagabhushana, Indian Institute of Science

WITHDRAWN

Design of a Repetitive Pulse Transformer

D. Sharma, K. Nanu, K. Nagesh, R. Sethi, Bhabha Atomic Research Center

The Prototype of the Injection Kicker System for CERN's LHC Collider

L. Ducimetière, N. Garrel, CERN, M. Barnes, G. Wait, TRIUMF

Unified Characteristics of Conditioned Metal-Oxide Varistors

A. Bystry, R. Ganefeld, Coal Energy Technology Center

Distinguishing Partial Discharge Analysis and Scope for Automation

S. Senthil Kumar, M. Narayanachar, R. Nema, Indian Institute of Science

UNAVAILABLE FOR PUBLICATION

A Closed Type Compact Modulator for 50-MW C-band (5712-MHz) Klystron

H. Matsumoto, H. Baba, T. Shintake, High Energy Accelerator Research Organization

Model of Electron Beam Pinch in Rod Pinch Diode

V. Ryzhov, S. Belomyttsev, A. Kirikov, I. Turchanovsky, Institute High Current Electronics,

V. Tarakonov, High Energy Density Research Investigation Center

The Hazards of Pulsed Power

L. Gordon, T. Fogle, Los Alamos National Laboratory

TABLE OF CONTENTS

To Use this Table of Contents: Scroll down or use the bookmarks in the left-hand frame to move to a new location in this index. Click on a blue paper title to view that paper. Titles in black indicate that no paper was available at the time of production. To return to this index after viewing a paper, click the PREVIOUS MENU bookmark in the left frame.

The Material on this CD-ROM was created from scanning each author's paper originals. Viewing of the text and graphics and the ease of readability will depend largely on content requiring scanning and the quality and/or consistency of each author's paper original.

POSTER SESSION B

Closing and Opening Switches, Applications, High Power Microwaves, Modeling, and HF Techniques

•	
Gallium Arsenide and Silicon FET-Type Switches for Repetitive Pulsed Power Applications M. Gundersen, X. Gu, A. Kuthi, <i>University of Southern California</i> , C. Myles, Q. Shui, <i>Texas Tech University</i>	437
New Generation of Drift Step Recovery Diodes (DSRD) for Subnanosecond Switching and High Repetition Rate Operation V. Kozlov, I. Smirnova, S. Moryakova, A. Kardo-Sysoev, Ioffe Phisico-Technical Institute	441
A Novel Type of Power Picosecond Semiconductor Switches Based on Tunneling-Assisted Impact Ionization Fronts P. Rodin, Technical University of Berlin, U. Ebert, W. Hundsdorfer, Center for Mathematics and Computer Science, I. Grekhov, Ioffe Physicotechnical Institute	445
Recent Progress in the Development of Compact Solid-State, High Voltage Radar Modulators	449
A Solid-State Opening Switch and Mod Anode Supply for the Advanced Light Source Klystrons M. Kempkes, I. Roth, M. Gaudreau, T. Hawkey, J. Casey, M. Mulvaney, Diversified Technologies, Inc.	453
The Generator of High Power Current Pulses Sequence on the Base High Current Diodes with Virtual Cathode Hysteresis	457
The Generator of High Power Electric Pulses Sequences on the Base of Electron Current Loop Breakage A. Paschenko, I. Shapoval, Kharkov Institute of Physics and Technology, V. Novikov, Scientific and Technological Center of Electrophysics	460

The Generator of High Power Voltage Pulses on the Base of Coaxial Plasma Switch with Homogeneous Power Supply	463
A. Paschenko, I. Shapoval, Kharkov Institute of Physics and Technology,	
V. Novikov, Scientific and Technological Center of Electrophysics	
Electrical and Optical Characteristics of Water under High Electric Stress	467
S. Katsuki, R. Joshi, M. Laroussi, F. Leipold, K. Schoenbach, Old Dominion University	
Recovery of Water Switches	471
S. Xiao, J. Kolb, M. Moselhy, K. Schoenbach, Old Dominion University, S. Katsuki, Kumamoto University, S. Kono, Ariake National College of Technology	
High Power Pseudospark Switches for Pulsed Power	475
V. Bochkov, D. Botchkov, V. Dyagilev, V. Kudinov, V. Ushich, <i>Pulsed Technologies, Ltd.</i> , V. Glouschenkov, R. Yusupov, <i>Samara State Air-Space University</i>	
Methods for Reducing the Forward Voltage Drop in Pseudospark Switches	479
V. Bochkov, V. Dyagilev, V. Ushich, <i>Pulsed Technology Ltd.</i> , O. Frants, Y. Korolev, I. Shemyakin, V. Geyman, R. Ivashov, N. Landl, <i>Institute of High Current Electronics</i> , K. Frank, M. Iberler, J. Urban, <i>University of Erlangen</i>	
Gas Discharge Switch Evaluation for RHIC Beam Abort Kicker Application	483
Triggered Spark Gap Switches and Their Erosion Characteristics	487
Charge Voltage, Trigger Voltage, and Gas Dielectric Effects on Multi-Channel Closing of a Russian Multi Gap Switch	491
K. LeChien, J. Gahl, University of Missouri	
Use of Triggered Vacuum Switches in a HV Crowbar	495
N. Matveev, D. Khabarov, High Voltage Research Center, D. Alferov, V. Sidorov, All-Russian Electrotechnical Institute	
Temporal Evolution of the Microwave Spectrum in the Course of a Radiation Pulse from	400
a Relativistic Cherenkov Plasma Maser	499
General Physics Institute, V. Tarakanov, High-Energy Density Research Investigation Center, E. Garate, University of California	
High-Power EM-Pulse Influence on Isolated Cells	502
I. Onishchenko, N. Gaponenko, N. Dikij, Y. Lonin, E. Medvedeva, N. Onishchenko, A. Tarasov, V. Ermolenko, <i>Kharkov Institute of Physics and Technology</i>	
Field Analysis of TWT HVPS Transformer and HV Module	506
Technology, D. Park, H. Kwon, J. Chun, LG Innotek Co., Ltd.	
Design of a Linear Induction Accelerator Module for a Hybrid Antenna-Amplifier,	
a Compact Controllable High-Power Microwave Source A Shlapakovski I Vintizenko, Tomsk Polytechnic University	510
A BHIADAKOVSKI I. VIIHIZCIIKO, TOMSK FOLVLECIJILIC UTLIVETSLIV	

Over Modulated HF Transmitter	513
J. Bare, Plasma Sonics, Ltd. Co.	
Modified Magnetocumulative Beamless Variable Structure Oscillator with Active Antennas A. Paschenko, I. Shapoval, Kharkov Institute of Physics and Technology, V. Novikov, Scientific and Technological Center of Electrophysics	517
The High Voltage System for ECRH on the JET Tokamak A. B. Sterk, A. Verhoeven, FOM Institute for Plasma Physics	521
Timing and Synchronization of Solid-State Pulsed-Power Modules (SSPPM) for Excimer Laser Applications	525
R. Ness, P. Melcher, R. Saethre, CYMER, Inc.	
Nanosecond Pulse, Injection Laser Bar Stack Driver P. Wilson, W. Nunnally, The University of Missouri	529
Status of the Pulsed Power System for the PHELIX Kilojoule/Petawatt-Laser at GSI Darmstadt	532
A. Tauschwitz, <i>Technical University of Darmstadt</i> , E. Dewald, B. Becker de-Mos, S. Samek, I. Reinhard, T. Kühl, <i>GSI Darmstadt</i>	
Evaluation of Weakly Ionized Plasma Channel by Accumulation Effect of Charged Particles for Laser-Triggered Lightning	536
Pulsed Ion Beam Evaporation at Low Temperature for the Preparation of Thin Films K. Yatsui, W. Jiang, H. Suematsu, S. Yang, R. Iwashita, T. Nagahama, N. Uchitomi, T. Arikado, <i>Nagaoka University of Technology</i>	540
A Two-Switch Mode Pulse Modulator for Plasma-Based Ion Implantation and Deposition . K. Yukimura, <i>Doshisha University</i> , K. Matsunaga, <i>Haiden Laboratory</i> , <i>Inc.</i>	544
Intense Low-Energy Electron and Ion Beams and Their Application S. Korovin, S. Bugaev, N. Koval, E. Oks, D. Proskurovsky, N. Sochugov, Institute of High Current Electronics	548
Application of Intense Pulsed Ion Beam to Material Processes K. Masugata, K. Takao, M. Shiotani, R. Tejima, T. Honda, I. Kitamura, T. Takahashi, <i>Toyama University</i>	552
Generation of an Atmospheric Pressure Non-Equilibrium Diffuse Discharge in Air by Means of a Water Electrode	556
FRANKA-Stein: Design, Operation and Industrial Application P. Hoppé, H. Bluhm, W. Frey, H. Giese, H. Massier, J. Singer, Institute for Pulsed Power and Microwave Technology, W. Edinger, U. Schweike, Institute for Chemical Technology	559
Development of an Industrial Electroporation Device C. Schultheiss, H. Bluhm, H. Mayer, Institute for Pulsed Power and Microwave Technology, M. Kern, Lutz & Kern	563

Compact System for Ceramics Joining Using Explosive Interlayer Metal Foil
High-Current, Large Volume, Glow Plasma Production Using Pulse Modulator
NOx Removal from Engine Exhaust Gas Using Multipoints DBD and Pulse Streamer Discharges with SOS Pulse Generator
Removal of Dilute SF ₆ in Emission Gas by Non-Thermal Plasma Generated by Pulsed Power579 Y. Minamitani, Y. Abe, Y. Higashiyama, <i>Yamagata University</i>
Average 120-kW MPC Modulator for Plasma De-NOx/De-SOx System
A Fast Capillary-Discharge Plasma Dedicated to EUV Radiation Production Possible Source for EUV Lithography
Effect of Magnetic Field on the Turn-On Characteristics of Power Semiconductor Devices Operated in Pulsed Power Circuits
The High Voltage Power Supply System of ECRH for HT-7 T. Ding, G. Hu, B. Liu, Institute of Plasma Physics in CAS, S. Du, Hefei University of Technology
MHz Pulsed Power Generator Using MOS-FETs W. Jiang, T. Matsuda, K. Yatsui, Nagaoka University of Technology, A. Tokuchi, Nichicon Corp.
Compact, High Repetition-Rate Pulsed Power Generator Using High-Speed SI-Thyristor602 W. Jiang, K. Yatsui, Nagaoka University of Technology, N. Shimizu, K. Iida, NGK Insulators, Ltd.
High Repetition-Rate, Low Jitter Pulsed Power Generator for Excimer Laser Applications605 W. Jiang, T. Matsuda, K. Yatsui, <i>Nagaoka University of Technology</i> , A. Tokuchi, <i>Nichicon Corp</i> .
Small-Size Pulsed Lasers in Medical Applications
A Hybrid Repetitive Opening Switch for Inductive Storage Systems and Protection of DC Circuits

ABSENT IN SESSION

Modeling of Role of Tamping Materials in Exploding Wire Opening Switches

A. Majalee, P. Doiphode, P. Sarkar, and S. Chaturvedi, Institute for Plasma Research

Thyristorised DC Opening Switch for Superconducting Coil Quench Protection

A. Varadharajulu, Institute for Plasma Research

Simulation of Breakdown Probability for Compact, High-Voltage Devices with Gas Insulation

K. Dubovenko, Institute of Pulse Research and Engineering

Rectangular Impulse Power Generator with Thyratrons

M. Badic, M. Marinescu, Research Institute for Electrical Engineering

Accurate Modeling of Reflection Loss in Plane Shield

M. Badic, M. Marinescu, Research Institute for Electrical Engineering

Development of Regulated High Current Floating DC Power Supply for Filament of 1.5-MW Tetrode

P. Khilar, A. Makawana, J. Soni, K. Sathyanarayana, Y. Srinivas, D. Bora, *Institute for Plasma Research*

Reconstruction of Tomography Images for Incomplete Projection Data

A. Khokonov, K. Stepanchenko, Kabardino-Balkarian State University

N2 Laser with Pumping from Inductive Energy Store with a Semiconductor Opening Switch

Y. Novoselov, S. Rukin, A. Andreev, D. Karnauh, Institute of Electrophysics

Solid State Pulsed High Voltage Generation Technique for Industrialization of Plasma Source Ion Implantation

S. Gupta, S. Mukherjee, P. John, Institute for Plasma Research, Gandhinagar,

A. Sharma, M.S. University

Magnetic Pulse Welding of Cryogenic Superconductors

V. Dmitriev, The University of Michigan-Dearborn

Method of Electromagnetic Forming of Cumulative Liquid Jet

V. Dmitriev, The University of Michigan-Dearborn

Model of Anode Spot Erosion under Pulse High Current Arc Discharges

G. Strelkova, Coal Energy Technology

Electrohydroimpulse Influence on Oil and Gas Wells

A. Molchanov, St. Petersburg State Mining Institute, A. Molchanov, D. Dmitriev, SPC GeoMIR, Ltd., E. Bolshakov, B. Ivanov, O. Pechersky, D. V. Efremov Scientific Research Institute of Electrophysical Apparatus

Pulsed Electric Discharge for Water Purification

N. Yavorovsky, M. Khaskelberg, J. Kornev, Tomsk Polytechnic University

Development of a 75-kV Hard Tube Modulator for the Transmitter of a Doppler Weather Radar

S. Ranade, J. Mulvadkar, G. Verma, Society for Applied Microwave Electronics Engineering and Research

A Versatile Solid-State Floating Deck Modulator for a TWT Test Bench

S. Ranade, S. Hangirgekar, S. Kulkarni, Society for Applied Microwave Electronics Engineering and Research

WITHDRAWN

Compact, Repetitively Pulsed, Stacked Blumlein Pulser

J. Sullivan, E. Gower, Lawrence Livermore National Laboratory

Effect of Magnetic Friction on Helical Instability of Arc Discharge in Plasma

R. Ganefeld, Coal Energy Technology Center

Power Electronic Converters for Electric Field Profile Control in a High Power Plasma Process

S. Pronko, K. Bowers, Archimedes Technology Group, Inc.

Test Results From a 25 kW PFM Direct AC-AC Frequency Changer

E. Limpaecher, M. Holveck, J. Lerch, D. Hammell, Princeton Power Systems

250 kW, 480 V AC Pulsed Frequency Modulator Test Results for a Direct AC-AC Frequency Changer Operation

R. Limpaecher, R. Rodriquez, P. Argo, Science Applications International, Corporation

PFM Configured as a VAR Compensator

R. Limpaecher, G. Hutchins, J. Lerch, E. Limpaecher, NewVAR

PFM Technology: Computer Modeling of Hardware and Control

M. Holveck, E. Limpaecher, J. Lerch, D. Hammell, Princeton Power Systems

PFM Technology: Basic Operation and Control

M. Holveck, E. Limpaecher, J. Lerch, D. Hammell, Princeton Power Systems

UNAVAILABLE FOR PUBLICATION

High Voltage Power Switch Based on Series-Connected Triggered Vacuum Switches

V. Sidorov, D. Alferov, Russian Electrotechnical Institute

Using of MCG in the Power Supply of Wideband Gyrotron

V. Khizhnyak, Institute of Applied Physics, A. Paschenko, I. Shapoval, Kharkov Institute of Physics and Technology, V. Novikov, Scientific and Technological Center of Electrophysics

Simulating Calculation of Electron Avalanche and Streamer Process in the Field Distortion Switch

B. Han, M. Han, H. Wang, Tsinghua University

TABLE OF CONTENTS

To Use this Table of Contents: Scroll down or use the bookmarks in the left-hand frame to move to a new location in this index. Click on a blue paper title to view that paper. Titles in black indicate that no paper was available at the time of production. To return to this index after viewing a paper, click the PREVIOUS MENU bookmark in the left frame.

The Material on this CD-ROM was created from scanning each author's paper originals. Viewing of the text and graphics and the ease of readability will depend largely on content requiring scanning and the quality and/or consistency of each author's paper original.

WORKSHOP SESSION 1 (ORAL) Industrial Applications

621
625
629
634
639
644
648
652
657

Effects of Thermoradiation Treatments on the DNA of Bacillus Subtilis Endospores
Ultrashort Pulse Electroporation: Applications of High Pulsed Electric Fields to Induced Caspase Activation of Human Lymphocytes
UNAVAILABLE FOR PUBLICATION
Electromedical Applications of Pulsed Power K. Schoenbach, Old Dominion University, S. Beebe, S. Buescher, Eastern Virginia Medical School
WORKSHOP SESSION 3 (ORAL) Advancements in Accelerators
The SNS Front End, an Injector for a High- Power Hydrogen Ion Accelerator
An Overview of High Voltage Dielectric Material for Traveling Wave Kicker Magnet Application
New Pulsed Power Technology for High Current Accelerators
The Polyphase Resonant Converter Modulator System for the Spallation Neutron Source Linear Accelerator
Solid-State Modulators for Commercial Pulsed Power Systems
WORKSHOP SESSION 4 (ORAL) High Power Devices and Applications
High Power Microwave Sources: Where do we go from here?
Progress in Gallium Arsenide Photoconductive Switch Research for High Power Applications

Applications of Coilgun Electromagnetic Propulsion Technology	.703
Atlas: A New High Performance System and the Optical-Transponder DC Probe as Applied to Bank Controls Instrumentation — and a Little History	.708
Advanced Cathode and Anode Research at the Air Force Research Laboratory D. Shiffler, K. Cartwright, M. Haworth, M. Ruebush, <i>Air Force Research Laboratory</i> , M. LaCour, K. Golby, <i>SAIC</i>	.712